Difference between Dwight's patent and my invention

There are some notable differences between my invention and Dwight's patent.

1. Effective length of crank arm

The effective length of a bicycle crank arm is the distance between the axis of the crank axle and the axis of the pedal spindle (axis of the pedal axle in Dwight's patent). In my invention, the effective length goes through one cycle of extension and retraction in each rotation of the crank arm (2) about the crank axle (1). In Dwight's patent, this length is fixed during cycling.

- Figure 6 in my patent application shows a section of the crank and pedal assembly for eight equally spaced crank arm directions. The assembly is on the right hand side of the bicycle. The axes of the crank axles (1) are at the centers of the circles. The axes of the pedal spindles (11) are at the centers of the shafts (5), because the shafts (5) are coaxial with the pedal spindles (11). The figure shows that the distance between the axes of the crank axle and the pedal spindle
  i. Increases from the minimum value to the maximum value in the first half of the power down stoke, in which the crank arm rotates clockwise from the 12 o'clock direction to the 3 o'clock direction,
  ii. Remains at the maximum value in the second half of the power down stroke (3 to 6 o'clock arm directions),
  iii. Decreases from the maximum value to the minimum value in the first half of the return upstroke (6 to 9 o'clock), and
  iv. Remains at the minimum value in the second half of the return upstroke (9 to 12 o'clock).

- The axes of the crank axle and pedal spindle in Dwight's invention are shown in the figure attached. The distance between them is fixed during cycling, because the pedal axle (**30**) is fixed to the pedal block (**32**) and the pedal block (**32**) is fixed to the clamping arm (**34**). The only way to change the arm length is to stop cycling and insert the projection (**48**) into a different notch (**46**) on the clamping arm (**34**).

2. Coaxially mounted shaft (5) and pedal spindle (11)

- My invention has a shaft (5) coaxially mounted with the pedal spindle (11). With coaxial mounting, one can rotate the shaft (5) without rotating the pedal spindle (11). The shaft (5) is used to rotate the plate (7) in cavity (6).

  There are two methods to mount the shaft (5) and the pedal spindle (11) coaxially.
  A. Cut a cylindrical hole along the axis of the pedal spindle (11) and insert the shaft (5) into this hole. (This method is shown in Figures 3 and 4 in my patent application.)
  B. Cut a cylindrical hole along the axis of the shaft (5) and insert the pedal spindle (11) into this hole. (This method is shown in Figure 8.)

- Dwight's patent does not have a shaft coaxially mounted with the pedal axle (**30**). In Figures 7 and 8 of this patent, the pedal axle (**30**) does not have a cylindrical hole for a shaft. The pedal axle (**30**) is also not inside a shaft, because the pedal (**28**) is not a shaft.

3. A plate (7) that rotates with the pedal (4) about the axis of the pedal spindle (11)

- In my invention, the plate (7) and the pedal (4) are fixed to the ends of the shaft (5). When the pedal (4) rotates about the axis of the pedal spindle (11), the plate (7) rotates about this axis by the same angle.

- In Dwight's patent, there is no plate that rotates with the pedal (28).

4. Pedal spindle (11) and pedal axle (30)

The pedal can spin round and round about a cylindrical rod in the crank and pedal assembly. Some people call this rod the 'pedal axle'. Others call it the 'pedal spindle'. Many bicycle repair books call the rod the 'pedal spindle', because the rod does not rotate.

- In my invention, the rod (11) is identified as the pedal spindle.

- In Dwight's patent, the rod (30) is identified as the pedal axle.